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A Conceptual Current Surge Protector for Incandescent Lamps

The problem:

It is estimated that 95 percent of all incandescent lamp failures are attributed to the high filament surge current during the initial application of power. The surge current is due to the "low cold resistance" of the filament relative to the resistance at the normal operating temperature.

The solution:

Insert a negative-temperature coefficient device, such as a thermistor, in series with the lamp filament. The initially high resistance of the device will prevent the surge current.

How it's done:

The thermistor could be made an integral part of the incandescent lamp socket or a disc type of device could be supplied which would fit within existing sockets and would form electrical contact between the lamp and socket (see Figure 1).

The thermistor should be selected for a cold resistance (77°F) approximately equal to one fourth of the normal hot resistance of the filaments to be protected. For example, a 100 watt lamp used in a 117 V ac circuit will have a hot resistance of approximately 130 ohms; the thermistor should have a cold resistance of approximately 32 ohms. Upon initial application of power, the cold resistance of the thermistor plus the cold resistance of the filament will be sufficient to prevent a destructive current surge. The thermistor resistance will immediately start to decrease due to self heating; the filament resistance will increase for the same reason until a state of equilibrium is reached. Assuming a lamp socket stabilization temperature of 400°F, the thermistor resistance at that temperature will be approximately 0.3 ohms and the power dissipated will be a minimal 0.2 watts.

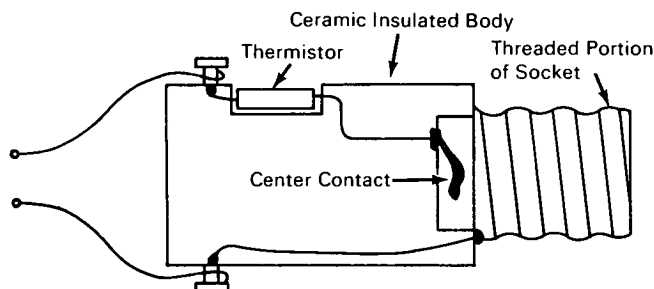


Figure 1(A). Thermistor as Integral Part of Lamp Socket

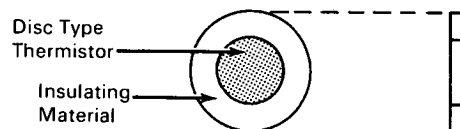


Figure 1(B). Thermistor Disc to be Installed in Socket

This device should be extremely useful for household lighting systems. Even though the initial cost of incandescent lamps is relatively low, the high failure rate becomes costly and the "nuisance factor" of replacement is worth eliminating.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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No patent action is contemplated by NASA.

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